IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Prathyusha K. Salla et al.	§	Confirmation No.	1160
	§	Group Art Unit:	3737
Serial No.: 10/723,894	§		
	§	Examiner:	Mehta, Parikha Solanki
Filed: November 26, 2003	§		
For: METHOD AND SYSTEM FOR RETROSPECTIVE GATING USING MULTIPLE INPUTS	§	Atty Docket:	132958-3 GEMS:0263/YOD/RAR/LIU

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November 19, 2007	**/John Rariden/**
Date	John M. Rariden

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal mailed on September 20, 2007, and received by the Patent Office on September 25, 2007. The Commissioner is authorized to charge the requisite fee of $510.00, and any additional fees which may be necessary to advance prosecution of the present application, to Account No. 07-0845, Order No. GEMS:0263/YOD/RAR (132958-3).

1. **REAL PARTY IN INTEREST**

The real party in interest is GE Medical Systems Information Technologies, Inc., the Assignee of the above-referenced application by virtue of the Assignment to GE Medical Systems Information Technologies, Inc., a subsidiary of General Electric Company, by Prathyusha K. Salla, Gopal B. Avinash, and Cherik Bulkes, recorded at reel 014755, frame 0386, on November 25, 2003. Accordingly, General Electric Company, as the parent company of the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

The Appellants are unaware of any other appeals or interferences related to this Appeal. The undersigned is the Appellants' legal representative in this Appeal.

3. **STATUS OF CLAIMS**

Claims 1-32 are currently pending, are currently under final rejection and, thus, are the subject of this Appeal.

4. **STATUS OF AMENDMENTS**

There are no outstanding claim amendments to be considered by the board.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention relates generally to imaging techniques and more particularly to the measurement of the overall motion undergone by an organ. *See, e.g.,* Application at page 1, lines 6-10. Specifically, the present technique relates to measuring the motion of one or more internal organs via one or more external sensors and/or via data acquired from a medical imaging system to determine the overall motion of at least one of the internal organs. *See, e.g., id.* By utilizing the motion measurements, quiescent periods for an organ of interest corresponding to an interval of minimal absolute motion may be determined. *See, e.g., id.* at page 2, line 20 to page 3, line 8. The quiescent period may be used to determine gating points that may be used to gate the image data (prospectively and/or retrospectively) to reduce motion artifacts in a resulting image. *See, e.g., id.* Furthermore, the quiescent period may be used to derive one or more motion compensation factors which may be applied during image processing to reduce motion artifacts. *See, e.g., id.*

The present Application contains thirty-two claims, namely claims 1-32, all of which are independent claims, and all of which are the subject of this appeal. Appellants respectfully note that while claims 1-32 are all independent claims, claims 1-32 may be grouped as follows: claims 1-8 recite similar subject matter, wherein claims 1, 3, 5, and 7 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 2, 4, 6, and 8 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; claims 9-16 recite similar subject matter, wherein claims 9, 11, 13, and 15 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 10, 12, 14, and 16 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; claims 17-24 recite similar subject matter, wherein claims 17, 19, 21, and 23 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 18, 20, 22, and 24 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention; and claims 25-32 recite similar subject matter, wherein claims 25, 27, 29, and 31 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 26, 28, 30, and 32 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention. The subject matter of the pending claims is summarized below. In order to provide the Board a thorough and organized summary of the recited subject matter, claims 1-32 have been summarized in accordance with the aforementioned groupings.

<u>Claims 1-8</u>

As noted above, claims 1-8 recite similar subject matter, wherein claims 1, 3, 5, and 7 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 2, 4, 6, and 8 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Claims 1, 3, 5, and 7

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 1 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 10-18; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 15, line 11 to page 16, line 9; *see also*, FIGs. 1, 2. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3, 4. Additionally, the method includes processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, lines 23-28; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (e.g., 144) generated (e.g., 146) from the portion of the set of image data (e.g., 134). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 4-6; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 3 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 1. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 3, discussions of the recited features of claim 3 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 3 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 10-18; *see also*, page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also,* page 11, line 23 to page 13, line 3; *see also*, page 15, line 11 to page 16, line 9; *see also*, FIGs. 1, 2. Additionally, the computer program includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Finally, the computer program includes a routine for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 23-28, *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 5 recites an imaging system corresponding to the subject matter recited by claim 1. With regard to the aspect of the invention set forth in independent claim 5, discussions of the recited features of claim 5 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 5 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system further includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 34, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 10-18; *see also*, page 9, lines 6-15; *see also*, page 11, line 4 to page 12, line 12; *see also*, FIGs. 1, 2. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 7 recites an imaging system corresponding to the subject matter recited by claim 1. With regard to the aspect of the invention set forth in independent claim 7, discussions of the recited features of claim 7 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 7 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15;

see also, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical activity (*e.g.*, 44, 46, 66, 68) indicative of the motion of two or more organs during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 4 to page 12, line 12; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2.

Claims 2, 4, 6, and 8

With regard to the aspect of the invention set forth in independent claim 2, discussions of the recited features of claim 2 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 2 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 20-29; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 15, line 11 to page 16, line 9; *see also*, FIGs. 1, 2. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3, 4. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 20, lines 12-14 and lines 26-31; *see also*, FIG. 5. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g* 142) based upon the two or more retrospective gating points and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 17-22; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 4 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 2. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 4, discussions of the recited features of claim 4 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 4 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 20-29; *see also*, page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also,* page 11, line 23 to page 13, line 3; *see also*, page 15, line 11 to page 16, line 9; *see also*, FIGs. 1, 2. The computer program further includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Additionally, the computer program a routine for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see* also, FIGs. 1, 5. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 6 recites an imaging system corresponding to the subject matter recited by claim 2. With regard to the aspect of the invention set forth in independent claim 6, discussions of the recited features of claim 6 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 6 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system further includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for two or more organs from at least one of one or more types of electrical sensors (*e.g.*, 34, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 3, lines 20-29; *see also*, page 9, lines 6-15; *see also*, page 11, line 4 to page 12, line 12; *see also*, FIGs. 1, 2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 6 to page 10, line 2; *see also*, page 10, line 14 to page 11, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 8 recites an imaging system corresponding to the subject matter recited by claim 2. With regard to the aspect of the invention set forth in independent claim 8, discussions of the recited features of claim 8 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 8 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1.

The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), to reconstruct (*e.g.*, 140) the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 7, lines 13-19; *see* also, page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the reconstructed data (*e.g.*, 142) from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 34) configured to measure electrical (*e.g.*, 40, 42, 62, 64) or non-electrical (*e.g.*, 44, 46, 66, 68) activity indicative of the motion of two or more organs during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 4 to page 12, line 12; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2.

Claims 9-16

As noted above, claims 9-16 recite similar subject matter, wherein claims 9, 11, 13, and 15 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 10, 12, 14, and 16 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Claims 9, 11, 13, and 15

With regard to the aspect of the invention set forth in independent claim 9, discussions of the recited features of claim 9 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 9 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 1-9; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 15, line 11 to page 16, line 9; *see also*, page 20, lines 1-7; *see also*, FIGs. 1, 2. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 3, 4. Additionally, the method includes processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, lines 23-28; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (e.g., 144) generated (e.g., 146) from the portion of the set of image data (e.g., 134). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 4-6; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 11 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 9. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 11, discussions of the recited features of claim 11 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 11 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 1-9; *see also*, page 8, lines 9-15 and lines 19-26; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 15, line 11 to page 16, line 9; *see also*, page 20, lines 1-7; *see also*, FIGs. 1, 2. Additionally, the computer program includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Finally, the computer program includes a routine for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 23-28, *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 13 recites an imaging system corresponding to the subject matter recited by claim 9. With regard to the aspect of the invention set forth in independent claim 13, discussions of the recited features of claim 13 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 13 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 1-9; *see also*, page 11, line 4 to page 12, line 12; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1, 2. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 15 recites an imaging system corresponding to the subject matter recited by claim 9. With regard to the aspect of the invention set forth in independent claim 15, discussions of the recited features of claim 15 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 15 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 4; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 12, line 6 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2.

Claims 10, 12, 14, and 16

With regard to the aspect of the invention set forth in independent claim 10, discussions of the recited features of claim 10 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 10 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 11-20; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 15, line 11 to page 16, line 9; *see also*, page 20, lines 1-7; *see also*, FIGs. 1, 2. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3, 4. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 20, lines 12-14 and lines 26-31; *see also*, FIG. 5. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.* 142) based upon the two or more retrospective gating points and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 17-22; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 12 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 10. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 12, discussions of the recited features of claim 12 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 12 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 11-20; *see also*, page 8, lines 9-15 and lines 19-26; *see also*, page 11, line 23 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 15, line 11 to page 16, line 9; *see also*, page 20, lines 1-7; *see also*, FIGs. 1, 2. The computer program further includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Additionally, the computer program a routine for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see* also, FIGs. 1, 5. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 14 recites an imaging system corresponding to the subject matter recited by claim 10. With regard to the aspect of the invention set forth in independent claim 14, discussions of the recited features of claim 14 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 14 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) for a respiratory organ from one or more types of electrical sensors (*e.g.*, 42) and one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 11-20;

see also, page 11, line 4 to page 12, line 12; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1, 2. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 6 to page 10, line 2; *see also*, page 10, line 14 to page 11, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 16 recites an imaging system corresponding to the subject matter recited by claim 10. With regard to the aspect of the invention set forth in independent claim 16, discussions of the recited features of claim 16 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 16 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), to reconstruct (*e.g.*, 140) the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 7, lines 13-19; *see* also, page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the reconstructed data (*e.g.*, 142) from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 4; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2. Finally, the imaging system (*e.g.*, 10) includes a sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 12, line 6 to page 13, line 3; *see also*, page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-2.

<u>Claims 17-24</u>

As noted above, claims 17-24 recite similar subject matter, wherein claims 17, 19, 21, and 23 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 18, 20, 22, and 24 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Claims 17, 19, 21, and 23

With regard to the aspect of the invention set forth in independent claim 17, discussions of the recited features of claim 17 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 17 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 22-31; *see also*, page 17, lines 1-25; *see also*, page 19, line 5 to page 20, line 7; *see also*, FIGs. 1-3. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3, 4. Additionally, the method includes processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, lines 23-28; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (e.g., 144) generated (e.g., 146) from the portion of the set of image data (e.g., 134). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 4-6; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 19 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 17. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 19, discussions of the recited features of claim 19 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 19 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 22-31; *see also*, page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 17, lines 1-25; *see also*, page 19, line 5 to page 20, line 7; *see also*, FIGs. 1-3. Additionally, the computer program includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Finally, the computer program includes a routine for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 23-28, *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 21 recites an imaging system corresponding to the subject matter recited by claim 17. With regard to the aspect of the invention set forth in independent claim 21, discussions of the recited features of claim 21 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 21 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data acquisition circuitry

18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 4, lines 22-31; *see also*, page 11, line 4 to page 12, line 12; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 23 recites an imaging system corresponding to the subject matter recited by claim 17. With regard to the aspect of the invention set forth in independent claim 23, discussions of the recited features of claim 23 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 23 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 86) indicative of the motion of a heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 12; *see also*, page 17, lines 1-12; *see also* page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-3. Finally, the imaging system (*e.g.*, 10) at least one sensor-based motion measurement system (*e.g.*, 40, 44) configured to measure electrical or non-electrical activity (*e.g.*, 82) indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 22; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 17, lines 1-12; *see also*, FIGs. 1-3.

Claims 18, 20, 22, and 24

With regard to the aspect of the invention set forth in independent claim 18, discussions of the recited features of claim 18 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 18 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.* 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15; *see also*, page 20, lines 9-23; *see also*, FIGs. 1, 5. The method further includes acquiring a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 1-12; *see also*, page 17, lines 1-25; *see also*, page 19, line 5 to page 20, line 7; *see also*, FIGs. 1-3. The method further includes processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3, 4. The method further includes reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 20, lines 12-14 and lines 26-31; *see also*, FIG. 5. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.* 142) based upon the two or more retrospective gating points and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 17-22; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 20 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 18. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 20, discussions of the recited features of claim 20 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 20 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 9-23; *see* *also*, FIGs. 1, 5. The computer program further includes a routine for acquiring a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 1-12; page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 17, lines 1-25; *see also*, page 19, line 5 to page 20, line 7; *see also*, FIGs. 1-3. Additionally, the computer program includes a routine for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Additionally, the computer program a routine for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see* also, FIGs. 1, 5. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 22 recites an imaging system corresponding to the subject matter recited by claim 18. With regard to the aspect of the invention set forth in independent claim 22, discussions of the recited features of claim 22 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 22 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest. *See, e.g., id.* at page

5, lines 14-18; *see also*, page 8, lines 9-15; *see also*, page 8, line 28 to page 9, line 4; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data acquisition circuitry 18, motion determination system 34, sensors 36) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72) comprising cardiac motion data (*e.g.*, MCG 86) acquired by one or more types of non-electrical sensors (*e.g.*, 46) and respiratory motion data (*e.g.*, pulmonary waveform 82) acquired by at least one of one or more types of electrical sensors (*e.g.*, 42) or one or more types of non-electrical sensors (*e.g.*, 46), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 1-12; page 11, line 4 to page 12, line 12; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. The imaging system (*e.g.*, 10) further includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 6 to page 10, line 2; *see also*, page 10, line 14 to page 11, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 24 recites an imaging system corresponding to the subject matter recited by claim 18. With regard to the aspect of the invention set forth in independent claim 24, discussions of the recited features of claim 24 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 24 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals (*e.g.*, 54, 58) representative of a region of interest. *See, e.g., id.* at page 8, line 9 to page 9, line 4; *see also*, page 13, line 11 to page 14, line 21; *see also*, FIGs. 1-2. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), to reconstruct (*e.g.*, 140) the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 7, lines 13-19; *see* also, page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the reconstructed data (*e.g.*, 142) from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 86) indicative of the motion of a heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 12; *see also*, page 17, lines 1-12; *see also* page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-3. Finally, the imaging system (*e.g.*, 10) at least one sensor-based motion measurement system (*e.g.*, 40, 44) configured to measure electrical or non-electrical activity (*e.g.*, 82) indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 22; *see also*, page 14, line 23 to page 15, line 9; *see also*, page 17, lines 1-12; *see also*, FIGs. 1-3.

<u>Claims 25-32</u>

As noted above, claims 25-32 recite similar subject matter, wherein claims 25, 27, 29, and 31 are directed towards a method, a computer program, and imaging systems in accordance with one aspect of the invention, and claims 26, 28, 30, and 32 are directed towards a method, a computer program, and imaging systems in accordance with a further aspect of the invention, as will be summarized below.

Claims 25, 27, 29, 31

With regard to the aspect of the invention set forth in independent claim 25, discussions of the recited features of claim 25 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 25 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 14-23; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. The method further includes processing (*e.g.*, 132) the sets of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3-4. Additionally, the method includes processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, lines 23-28; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (e.g., 144) generated (e.g., 146) from the portion of the set of image data (e.g., 134). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 4-6; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 27 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 25. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 27, discussions of the recited features of claim 27 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 27 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 14-23; *see also*, page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. Additionally, the computer program includes a routine for processing (*e.g.*, 132) the sets of motion data (*e.g.*, 72, 80) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Finally, the computer program includes a routine for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 23-28, *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 29 recites an imaging system corresponding to the subject matter recited by claim 25. With regard to the aspect of the invention set forth in independent claim 29, discussions of the recited features of claim 29 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 29 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, ECG 84, MCG 86) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, lines 14-23; *see also*, page 14, line 23 to page 15, line 9; *see also* page 17, lines 1-25; *see also*, FIGs. 1-3. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Finally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 138) a portion of the set of image data (*e.g.*, 134) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 31 recites an imaging system corresponding to the subject matter recited by claim 25. With regard to the aspect of the invention set forth in independent claim 31, discussions of the recited features of claim 31 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 31 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals representative of a region of interest, wherein the imager (*e.g.*, 12) comprises one of a MRI imager, a PET imager, a nuclear imager, an X-ray imager, a PET-CT imager, and an ultrasound imager. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), and to process a portion of the plurality of signals based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the plurality of signals from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes at least one sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 86) indicative of the motion of a heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 12; *see also*, page 12, line 24 to page 13, line 3; *see also*, page 17, lines 1-25; *see also* page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-3. Finally, the imaging system (*e.g.*, 10) includes at least one sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity (*e.g.*, 84) indicative of the motion of the heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.*

Claims 26, 28, 30, and 32

With regard to the aspect of the invention set forth in independent claim 26, discussions of the recited features of claim 26 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 26 provides a method for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 3, line 10 to page 6, line 6; *see also*, FIG. 5. The method includes acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The method further includes acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, line 25 to page 6, line 6; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. The method further includes processing (*e.g.*, 132) the sets of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; see *also*, FIGs. 3-4. The method includes comprises reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 20, lines 12-14 and lines 26-31; *see also*, FIG. 5. Additionally, the method includes processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.* 142) based upon the two or more retrospective gating points and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 4, 5. Finally, the method includes displaying or storing an image (*e.g.*, 144) generated (*e.g.*, 146) from the portion of the set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 15-19; *see also*, page 21, lines 17-22; *see also*, FIGs. 1, 5.

Appellants respectfully note that claim 28 recites a corresponding computer program, provided on computer readable media (*e.g.* RAM, magnetic and optical storage devices, etc.), corresponding to the subject matter recited by claim 26. *See e.g., id.* at page 9, line 25 to page 10, line 2. With regard to the aspect of the invention set forth in independent claim 28, discussions of the recited features of claim 28 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 28 provides a computer program, provided on one or more computer readable media, for processing (*e.g.*, 138) image data (*e.g.*, 134). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, FIG. 1. The computer program includes a routine for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The computer program further includes a routine for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, line 25 to page 6, line 6; *see also*, page 8, lines 9-15 and lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 17, lines 1-25; *see also*, FIGs. 1-3. The computer program further includes a routine for processing (*e.g.*, 132) the sets of motion data (*e.g.*, 72, 80) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, page 20, lines 14-17; *see also*, FIGs. 1, 3-4. Additionally, the computer program a routine for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see* also, FIGs. 1, 5. Finally, the computer program includes a routine for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 8, lines 19-26; *see also*, page 9, line 25 to page 10, line 2; *see also*, page 20, line 31 to page 21, line 6; *see also*, page 21, lines 14-22; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 30 recites an imaging system corresponding to the subject matter recited by claim 26. With regard to the aspect of the invention set forth in independent claim 30, discussions of the recited features of claim 30 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 30 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes means (*e.g.*, imager 12) for acquiring (*e.g.*, 136) a set of image data (*e.g.*, 134) representative of a region of interest from an imager (*e.g.*, 12) of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes means (*e.g.*, ECG 84, MCG 86) for acquiring (*e.g.*, 64, 68) a set of motion data (*e.g.*, 72, cardiac motion waveforms 80) for a heart from one or more types of electrical sensors (*e.g.*, 42, ECG 84) and one or more types of non-electrical sensors (*e.g.*, 46, MCG 86), wherein the set of image data (*e.g.*, 134) is acquired substantially concurrent with the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 5, line 25 to page 6, line 6; *see also*, page 14, line 23 to page 15, line 9; *see also* page 17, lines 1-25; *see also*, FIGs. 1-3. The imaging system further includes (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 132) the set of motion data (*e.g.*, 72) to extract two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, lines 9-19; *see also*, page 18, line 24 to page 19, line 12; *see also*, page 19, line 26 to page 20, line 1; *see also*, FIGs. 1, 3-4. Additionally, the imaging system (*e.g.*, 10) includes means (*e.g.*, data processing circuitry 20, operator workstation 22) for reconstructing (*e.g.*, 140) the set of image data (*e.g.*, 134) to generate a set of reconstructed data (*e.g.*, 142). *See, e.g., id.* at page 9, lines 6 to page 10, line 2; *see also*, page 10, line 14 to page 11, line 2; *see also*, page 20, lines 12-14 and lines 26-31; *see also*, FIGs. 1, 5. Finally, the imaging system (*e.g.*, 10) means (*e.g.*, data processing circuitry 20, operator workstation 22) for processing (*e.g.*, 148) a portion of the set of reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating points (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 9, line 6 to page 10, line 19; *see also*, page 20, lines 23-28; *see also*, FIGs. 1, 4-5.

Appellants respectfully note that claim 32 recites an imaging system corresponding to the subject matter recited by claim 26. With regard to the aspect of the invention set forth in independent claim 32, discussions of the recited features of claim 32 can be found at least in the below cited locations of the specification and drawings. By way of example, an exemplary embodiment of claim 32 provides an imaging system (*e.g.*, 10). *See, e.g., id.* at page 8, lines 9-15; *see also*, FIG. 1. The imaging system (*e.g.*, 10) includes an imager (*e.g.*, 12) configured to generate a plurality of signals representative of a region of interest, wherein the imager (*e.g.*, 12) comprises one of a MRI imager, a PET imager, a nuclear imager, an X-ray imager, a PET-CT imager, and an ultrasound imager. *See, e.g., id.* at page 5, lines 16-18 and lines 27-29; *see also*, page 8, lines 9-15; *see also*, page 22, lines 12-16; *see also*, FIGs. 1, 5. The imaging system (*e.g.*, 10) further includes data acquisition circuitry (*e.g.*, 18) configured to acquire the plurality of signals. *See, e.g., id.* at page 8, line 28 to page 9, line 7; *see also*, FIG. 1. The imaging system (*e.g.*, 10) further includes data processing circuitry (*e.g.*, 20) configured to receive the plurality of signals, to process a set of motion data (*e.g.*, 72) to derive two or more retrospective gating points (*e.g.*, 110) and one or more motion compensation factors (*e.g.*, 106), to reconstruct (*e.g.*, 140) the plurality of signals to generate a set of reconstructed data (*e.g.*, 142), and to process (*e.g.*, 148) a portion of the reconstructed data (*e.g.*, 142) based upon the two or more retrospective gating signals (*e.g.*, 110) and the one or more motion compensation factors (*e.g.*, 106). *See, e.g., id.* at page 7, lines 13-19; *see* also, page 9, lines 8-19; *see also*, FIGs. 1, 4-5. The imaging system (*e.g.*, 10) further includes system control circuitry (*e.g.*, 16) configured to operate at least one of the imager (*e.g.*, 12) and the data acquisition circuitry (*e.g.*, 18). *See, e.g., id.* at page 8, lines 17-26; *see also*, FIG. 1. Additionally, the imaging system (*e.g.*, 10) includes an operator workstation (*e.g.*, 22) configured to communicate with the system control circuitry (*e.g.*, 16) and to receive at least the processed portion of the reconstructed data (*e.g.*, 142) from the data processing circuitry (*e.g.*, 20). *See, e.g., id.* at page 9, line 8 to page 10, line 19; *see also*, FIGs. 1, 5. Additionally, the imaging system (*e.g.*, 10) includes at least one sensor-based motion measurement system (*e.g.*, 44) configured to measure non-electrical activity (*e.g.*, 86) indicative of the motion of a heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.* at page 11, line 23 to page 12, line 12; *see also*, page 12, line 24 to page 13, line 3; *see also*, page 17, lines 1-25; *see also* page 14, line 23 to page 15, line 9; *see also*, FIGs. 1-3. Finally, the imaging system (*e.g.*, 10) includes at least one sensor-based motion measurement system (*e.g.*, 40) configured to measure electrical activity (*e.g.*, 84) indicative of the motion of the heart during imaging to contribute to the set of motion data (*e.g.*, 72). *See, e.g., id.*

A benefit of the invention, as recited in these claims, is to reduce motion artifacts in a resulting image when imaging an organ of interest. Accordingly, an imager and multiple sensors (*e.g.*, electrical sensors 42, non-electrical sensors 46) are provided by the technique for acquiring motion data. The sensors may be configured to acquire motion data from one or more organs. The motion data is processed to determine one or more quiescent periods for the organ of interest corresponding to an interval of minimal absolute motion for the organ. By analyzing the quiescent periods, one or more gating points, as well as motion compensation factors, may be extracted and applied to the imaging process in order to generate images having reduced motion artifacts. This is a clear difference and distinction from the prior art, as discussed below.

6. **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

First Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's first ground of rejection in which the Examiner rejected claims 1-8 and 25-32 under 35 U.S.C. § 102(e) as being anticipated by Larson et al., U.S. Publication No. 2004/0155653 (hereinafter the "Larson reference").

Second Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's second ground of rejection in which the Examiner rejected claims 9-24 under 35 U.S.C. § 103(a) as being obvious in view of the Larson reference and Rogers, U.S. Patent No. 5,477,144 hereinafter the "Rogers reference").

7. **ARGUMENT**

As discussed in detail below, the Examiner has improperly rejected the pending claims. Moreover, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under Sections 102 and 103. According, Appellants respectfully requests full and favorable consideration by the Board, as Appellants strongly believe that claims 1-32 are in condition for allowance.

A. **First Ground of Rejection**

The Examiner rejected claims 1-8 and 25-32 under 35 U.S.C. § 102(e) as being anticipated by the Larson reference. Appellants respectfully traverse this rejection.

1. **Judicial precedent has clearly established a legal standard for a *prima facie* anticipation rejection.**

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *See Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir.1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir.1990). That is, the prior art reference must show the *identical invention "in as complete detail as contained in the ... claim"* to support a *prima facie* case of anticipation. *Richardson v. Suzuki Motor Co*., 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989) (emphasis added). Thus, for anticipation, the cited reference must not only disclose all of the recited features but must also disclose the *part-to-part relationships* between these features. *See Lindermann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 U.S.P.Q. 481, 486 (Fed. Cir.1984). Accordingly, the Appellants need only point to a single element or claimed relationship not found in the cited reference to demonstrate that the cited reference fails to anticipate the claimed subject matter. A *strict correspondence* between the claimed language and the cited reference must be established for a valid anticipation rejection.

Moreover, the Appellants submit that, during patent examination, the pending claims must be given an interpretation that is *reasonable* and *consistent* with the specification. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); see also M.P.E.P. §2111 (describing the standards for claim interpretation during prosecution). Indeed, the *specification* is "<u>the primary basis for construing the claims</u>." *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005). (Emphasis added). It is usually dispositive. *See id.* Interpretation of the claims must also be consistent with the interpretation that those skilled in the art would reach. *See In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. That is, recitations of a claim must be read as they would be interpreted by those of ordinary skill in the art. *See Rexnord Corp. v. Laliram Corp*., 60 U.S.P.Q.2d 1851, 1854 (Fed. Cir. 2001); *see also* M.P.E.P. §2111.01. In summary, an Examiner, during prosecution, must interpret a claim recitation as one of ordinary skill in the art would reasonably interpret the claim in view of the specification. *See In re American Academy of Science Tech Center,* 70 U.S.P.Q.2d 1827 (Fed. Cir. 2004).

2. **The Examiner's use of the Larson reference to establish a *prima facie* case of anticipation against claims 1-8 is improper because the Larson reference fails to disclose acquiring a set of motion data for two or more organs using *sensor-based* measurement systems as recited by claims 1-8.**

With regard to independent claims 1-8, the claims generally recite, *inter alia*, acquiring a set of image data representative of a region of interest, and acquiring a set of motion data for two or more organs using **sensor-based** measurement systems. Specifically, claims 1-6 recite, *inter alia*, that the sensor based measurement systems may include "at least one of one or more types of electrical sensors or one or more types of non-electrical sensors." (Emphasis added). Furthermore, claims 7 and 8 recite, *inter alia*, that the **sensor-based** measurement systems may be configured to measure electrical or non-electrical activity of the motion of two or more organs.

In contrast, the Larson reference generally describes the use of image-based techniques (*e.g.*, MR imaging) to derive motion data. *See* Larson, paragraphs 10, 14, 25, and 35. In rejecting claims 1-8 under the Larson reference, the Examiner has persistently equated the MR imager described in the Larson reference to an "electrical sensor," as recited by claims 1-8. *See* Final Office Action mailed June 20, 2007 (hereinafter "Final Office Action"), page 6, lines 5-8; *see also* Advisory Action mailed September 18, 2007 (hereinafter "Advisory Action"), page 2. Appellants respectfully assert that the present Application *clearly* distinguishes between image-based and sensor-based systems for acquiring motion data. For example, the specification states that motion data may be derived either by using an imaging system (*e.g.*, MR system, CT system, X-ray system), wherein motion data for an organ or organs of interest may be determined from the analyzing the image data itself in various domains. *See* Application, page 10, line 21 to page 11, line 2. The specification further states that motion data may also be derived by using a sensor-based system, which may include electrical sensors (*e.g.*, one or more ECGs, vector cardiography system) and/or non-electrical or mechanical sensors (*e.g.*, accelerometers, optical markers, displacement sensors, forced sensors, ultrasonic sensors, strain gauges, pressure sensors, and photodiodes), typically in the form of a pad or contact that may be disposed on the skin of a patient. *See id.* at page 11, line 4 to page 12, line 12. Indeed, the specification clearly sets forth that the acquisition of motion data using sensor-based techniques is *distinct* from those that utilize the image data itself.

In view of the *clear* distinction between image-based and sensor-based techniques for measuring motion data, as set forth in the specification, Appellants believe that the Examiner's interpretation in correlating the MR imager of Larson to the "electrical sensor" of the present claims is not only unreasonable, but that the Examiner has misapplied long standing legal precedent stating that pending claims must be given an interpretation that is *reasonable* and *consistent* with the specification, and that the interpretation must be what those skilled in the art would reach. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); *see also In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. In fact, the Examiner appears to be interpreting the pending claims in a manner that is in direct contradiction with the stated legal guidelines for claim interpretation. For example, in the Final Office Action, the Examiner erroneously suggests that reference to the specification in interpreting the claim language constitutes improperly reading limitations into the claims. *See* Final Office Action, page 2, paragraph 5. In other words, the Examiner seems to be implying that the specification should *not* be used in interpreting claim language, a view that is not only improper, but also in direct contrast with the established case law.

While Appellants certainly appreciate the difficulty faced by the Examiner in interpreting the claims in view of the specification without improperly importing limitations from the specification into the claims, Appellants respectfully note that the Federal Circuit, sitting *en banc*, recently provided a summary and additional guidance regarding the proper interpretation of claims in view of the specification. *See Phillips v. AWH Corp.*, 75 U.S.P.Q.2d 1321 (Fed. Cir. 2005) (*en banc*). In *Phillips*, the Federal Circuit again emphasized the primacy of the specification in claim interpretation. Particularly, the *Phillips* court noted that the specification "is always highly relevant to the claim construction analysis. Usually, it is dispositive; *it is the single best guide to the meaning of a disputed term*." *Phillips*, 75 U.S.P.Q.2d at 1327 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)) (Emphasis added). Moreover, the court also noted that:

> Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language *and most naturally aligns with the patent's description of the invention* will be, in the end, the correct construction.

Phillips, 75 U.S.P.Q.2d at 1328-29 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)) (Emphasis added). Indeed, the Examiner's interpretation of the claims in correlating the MR imager of Larson to an "electrical sensor" is not only clearly in direct contrast with legal precedent established by both the former C.C.P.A. and the Federal Circuit, but also inconsistent with the reading one skilled in the art would reach when interpreting the claims. Nevertheless, the Examiner persisted to maintain this improper rejection in the Advisory Action even *after* Appellants reiterated the aforementioned legal guidelines regarding claim interpretation. *See* Appellants' Response to Final Office Action, page 19, line 30 to page 20, line 19; *see also* Advisory Action, page 2.

With the foregoing and controlling case law in mind, Appellants reiterate that the specification *clearly distinguishes* between the use of image-based systems (*e.g.,* MR system, CT system, X-ray system) and sensor-based systems (*e.g.,* ECGs, MCGs, accelerometers, displacement sensors, etc.). *See* Application, page 10, line 21 to page 11, line 2; *see also* page 11, line 4 to page 12, line 12. Therefore, in view of this *clear distinction* drawn between image-based and sensor-based techniques for measuring motion, as set forth in the specification, no *reasonable* construction of claims 1-8 based on the specification could interpret the sensor-based approaches for acquiring motion data to be equivalent to the image-based approaches (*e.g.,* MR imager) for acquiring motion data, as generally described in the Larson reference. Certainly, the mere fact that an MR imaging system is powered by electricity does not make the MRI system an electrical sensor, as suggested by the Examiner. *See* Final Office Action, page 2, paragraph 5. Hence, no reasonable construction of the claim 1-8 could reasonably equate an MR imaging system, as disclosed in the Larson reference, with an electrical sensor as described in the present Application. Indeed, the Examiner's assertion of such equivalence, in clear contrast to the plain teachings of the specification of the present application noted above, appears disingenuous.

This point is further evidenced by the plain language of the claims in question. For example, independent claims 1-8 each recite the acquisition of image data (or the means for acquiring such image data) as *separate* from the acquisition of motion data by electrical or non-electrical sensors. Claims 5 and 6 recite means for acquiring image data that are *separate and distinct* from the means for acquiring motion data. Indeed, claims 7 and 8 recite an imager *separately* from the recited sensor-based motion measurement system. Therefore, the plain language of the claims, and the separate recitations of motion and image data (or, correspondingly, of sensor-based motion measurement systems and imagers) would appear to preclude the Examiner's interpretation of an MR imaging system, as recited in the Larson reference, as acquiring motion data or of being a sensor-based motion measurement system. Furthermore, the Examiner seems unable to properly correlate the *separate and distinct* "motion data" and "image data" recited in claims 1-8 to corresponding elements in the Larson reference, a deficiency that is further emphasized wherein the Examiner's *only* line of reasoning in asserting that Larson teaches *both* image *and* motion data is that the imaging data acquired by the MR imager of the Larson reference "is equivalent to both the image data **and** the motion data claimed in the method and system of the instant application." Final Office Action, page 6, lines 5-8. (Emphasis added). It is well established case law that for a prior art reference to anticipate under Section 102, **every element** of the claimed invention must be **identically shown** in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir.1990). It is unclear to Appellants how a single element, such as the MR image data of the Larson reference, can be properly correlated, as the Examiner has attempted, to two *separate* and *distinct* elements of claims 1-8 when the specification clearly distinguishes between (1) image data acquired from an image-based system,

(2) motion data acquired from image-based system (*e.g.*, by analyzing image data in various domains); and (3) motion data acquired from a sensor-based system. *See* Application, page 8, lines 9-15; *see also* page 9, lines 6-19; *see also* page 10, line 21 to page 11, line 12; *see also* page 11, line 23 to page 12 line 12; *see also*, FIG. 1.

In view of the foregoing discussion, it is believed that Appellants have sufficiently demonstrated that the Larson reference fails teach or suggest acquiring a set of motion data for two or more organs using sensor-based measurement systems (either electrical or non-electrical sensors), as generally recited by claims 1-8. Rather, the Larson reference primarily discusses the acquisition of motion data using an image-based system, specifically, an MR imager. *See* Larson, paragraph 10, 14, 25, and 35. Furthermore, to the extent that the Larson reference does appear to contemplate the use of sensor-based motion measurement techniques, they do not appear to be used for acquiring motion data for two or more organs. Indeed, in what appears to be the only concrete example in Larson where motion data is acquired for two organs, the motion for both organs is acquired using image data or the motion for one of the organs is acquired using image data while the motion for the other organ is acquired using sensor data (*e.g.,* conventional ECG). *See* Larson, paragraphs 62-63. In other words, while the Larson reference seems to suggest that motion data for a first organ (*e.g.,* cardiac motion data for a heart) may be acquired using a sensor-based system (*e.g.,* ECG) while motion data for a second organ (*e.g.,* respiratory organs) is acquired by the image-based MR imaging system. *See id.* However, the Larson reference appears to be completely deficient of any language teaching or suggesting that motion data for two or more organs may be acquired using *sensor-based* techniques. In view of these deficiencies, among others, the Larson reference does not appear to disclose *all* the recited elements of claims 1-8 and, therefore, the Examiner has failed to establish a *prima facie* case of anticipation with regard to independent claims 1-8.

3. **<u>The Examiner's use of the Larson reference to establish a *prima facie* case of anticipation against claims 25-32 is improper because the Larson reference fails to disclose acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors as recited by claims 25-32.</u>**

With regard to independent claims 25-32, the claims generally recite the acquisition of motion data for a heart using <u>sensor-based</u> measurement systems including <u>both</u> electrical <u>and</u> non-electrical sensors. As noted above, sensor-based techniques are distinct from the Larson reference which generally recites the use of <u>image-based</u> techniques to derive motion data. *See* Larson, paragraphs 10, 14, 25, and 35. Furthermore, it does not appear that the Larson reference teaches or suggests the use of *both* electrical and non-electrical sensors.

While the Larson reference appears to disclose an electrocardiogram (ECG) as one type of electrical sensor for acquiring cardiac motion data, this appears to be the *only* sensor-based device mentioned in the Larson reference. The Examiner's rejection of claims 25-32 again seems to be based on the premise that an MR imager is equivalent to a sensor-based system. *See* Larson, paragraphs 62-63; *see also* Final Office Action, page 2, paragraph 5; *see also* Advisory Action, page 2. However, as discussed above with regard to claims 1-8, the present Application *clearly* distinguishes between image-based and sensor-based systems for acquiring motion data. *See* Application, Figs 1 and 2; *see also* page 10, line 21 to page 11, line 12; *see also* page 11, line 14 to page 15, line 9. Appellants further reiterate that by equating the MR imager taught by the Larson reference to an electrical sensor, the Examiner is effectively ignoring the distinction set forth by the specification. As stated above, this is clearly an improper and misguided application of the well established legal guidelines regarding claim interpretation stating that claims must be given an interpretation that is <u>*reasonable*</u> and <u>*consistent*</u> with the specification, and that the interpretation must be what those skilled in the art would reach. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re Morris*, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); *see also In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111.

Further, the plain language of claims 25-32 appear to preclude interpretation of an MR imaging system, as taught in the Larson reference, as being either an electrical or non-electrical sensor or sensor-based measurement system. For example, claims 25-28 separately recite the acquisition of image data using an imager of a MRI system (or PET system, X-ray system, and so forth) from the acquisition of motion data using electrical sensors and non-electrical sensors. Likewise, claims 29-30 recite corresponding means for acquiring image data, such as with an MRI system imager, and means for acquiring motion data using electrical sensors and non-electrical sensors. Indeed, claims 31 and 32 separately recite an imager of a MRI system (or of a PET, X-ray, PET-CT, or other modality), a sensor-based motion measurement system configured to measure non-electrical activity, and a sensor-based motion measurement system configured to measure electrical activity. Thus the plain language of the claims would appear to preclude interpreting an MR imaging system, as recited in the Larson reference, as acquiring motion data or of being a sensor-based motion measurement system.

Additionally, as noted in previous communications, the Larson reference does not appear to make any mention regarding the use of non-electrical sensors, as set forth in the present Application and as recited in claims 25-32. It should be further noted that, with regard to claims 25-32, the recited non-electrical sensors are not recited as being alternative to electrical sensors, but rather recite the use of both electrical sensors **and** non-electrical sensors. *See* Application, claims 25-32. Therefore, even assuming hypothetically that the Examiner's interpretation of claims 25-32 is correct in that the Larson reference discloses multiple sensors (MR imager and ECG), the Larson reference still fails to anticipate claims 25-32 because the Larson reference does not appear to disclose the use of *non-electrical* sensors. The only devices mentioned in the Larson reference for acquiring motion data appear to be an imaging device (MR-imager), and an electrocardiogram (ECG). *See* Larson, paragraphs 10, 14, 25, 35, and 62-63. First, it is well known in the art that electrocardiograms are electrical based sensors for measuring electrical activity, typically of a human heart. Furthermore, by the Examiner's own promulgation, an MR imager *must* at least be an electrical because it is powered by electricity. *See* Final Office Action, page 2, paragraph 5. Therefore, under the hypothetical assumption that the MR imager of Larson can be classified as a sensor, it appears the Larson reference still teaches *only* electrical sensors and makes absolutely no mention regarding the use of non-electrical sensors. Indeed, Appellants have noted the deficiency of non-electrical sensors in the Larson reference several times in previous communications. *See* Response to Final Office Action, page 22, lines 16-26; *see also* Response to Office Action mailed November 17, 2006, page 29, lines 13-19. On each occasion, the Examiner has failed to indicate where in the Larson reference such non-electrical sensors are described. In view of these deficiencies, the Larson reference fails to disclose *all* the recited elements. As such, the Examiner has failed to establish a *prima facie* case of anticipation with regard to independent claims 25-32.

4. **The Examiner's use of the Larson reference to establish a *prima facie* case of anticipation against claims 1-8 and 25-32 is further deficient because the Larson reference fails to disclose one or more motion compensation factors as recited by claims 1-8 and 25-32.**

In addition to being deficient for the reasons stated above, Appellants further assert that the Larson reference fails to disclose motion compensation factors as recited by independent claims 1-8 and 25-32. Specifically, independent claims 1-8 and 25-32 recite, *inter alia*, deriving "one or more motion compensation factors" and processing image data "based upon…the one or more motion compensation factors." (Emphasis added). In rejecting claims 1-8 and 25-32, the Examiner stated in the Final Office Action that the Larson reference does indeed disclose motion compensation factors. Specifically, the Examiner asserted that "Larson ('653) also states that 'the extracted timing information may be processed to provide temporal correspondence with the motion…[t]he processing may comprise extracting a peak, phase, or rate of a time-varying signal' (¶ [0018])." *See* Final Office Action, page 6. However, after careful review, Appellants do not believe the passage cited by the Examiner discloses the motion compensation factors recited by claims 1-8 and 25-32.

To the contrary, the passages cited by the Examiner appear to merely describe the extraction of gating points in MR imaging. It does not appear, as suggested by the Examiner, that the passages disclose motion compensation factors. Appellants respectfully note that the present Application draws a *clear distinction* between gating points and motion compensation factors. For example, the present Application describes that in addition to acquiring gating points prospectively and retrospectively for reducing motion artifacts when imaging an organ of interest, motion data may also be used to determine motion compensation factors. *See* Application, page 18, line 24 to page 19, line 3; *see also* FIG. 4. For example, motion compensation factors may include predicting future motion by modeling anticipated motion either based on the acquired motion data or based on known a priori data about a moving organ. *See id.* The motion modeling may be accomplished by using both iterative (based directly on motion data) or non-iterative (based on a priori information) algorithms for optimizing criteria in both spatial and transform domains. *See id.* Further, the motion compensation factors may be extracted <u>in addition to, or instead of</u>, gating points. *See id.* at page 19, lines 5-24. In other words, the present Application *clearly* describes motion compensation factors and gating points as being *separate and distinct* elements. While motion compensation factors are based on compensation of motion based on motion modeling algorithms, the gating points are derived based on <u>intervals</u> within a set multi-input motion data which correspond to an interval of little or no motion for an organ of interest. *See id.*

With the foregoing distinction in mind, Appellants now direct the Board's attention to the passages of the Larson reference cited by the Examiner, reproduced below in their entirety for the Board's convenience:

> [0018] The extracted timing information may be processed to provide <u>temporal correspondence</u> with the motion (e.g., a *time value* representing the time <u>at which the motion begins</u> or the time of <u>another event</u> during the motion). The processing may comprise extracting a peak, phase, or rate of a time-varying signal.

> [0019] The timing information may be used to retrospectively or prospectively synchronize the MR imaging data with the motion. The motion of the patient may be periodic (e.g., the periodic movement of the heart or lungs). The timing information may comprise a time-varying signal that varies in value over the period of the motion. The MR imaging data may be segmented cine imaging data.
>
> Larson, page 2, paragraphs 18-19. (Emphasis added).

As noted above, paragraph 18 of the Larson reference appears to be describing the determination of timing intervals by assigning time values representing various points of time in the motion data corresponding to where motion begins to occur. The Larson reference further describes that the time intervals may extract peaks, phases, or rate of a time-varying signal, and that these time intervals may be used to "retrospectively or prospectively synchronize the MR imaging data with the motion." Larson, paragraphs 18-19. Indeed, the Larson reference, at best, appears to merely describe the determination of one or more gating points based on the time intervals in order to synchronize the MR imaging data with certain periods in the overall motion of an organ of interest. However, the Larson reference appears to be completely deficient of any passages describing motion modeling using iterative or non-iterative algorithms or the like and, therefore, Appellants believe that the Larson references fails to teach or suggest extracting and applying motion compensation data as recited by claims 1-8 and 25-32. In view of these deficiencies, Appellants believe the Larson reference fails to disclose *all* the recited elements and, accordingly, the Examiner has failed to establish a *prima facie* case of anticipation with regard to independent claims 1-8 and 25-32.

5. **Request Withdrawal of the Rejection**

In view of the reasons set forth above, Appellants respectfully request that the Board direct the Examiner to withdraw the rejection of claims 1-8 and 25-32 under 35 U.S.C. § 102(e) and to allow the claims.

B. **Second Ground of Rejection**

The Examiner rejected claims 9-24 under 35 U.S.C. § 103(a) as being obvious in view of the Larson and Rogers references. Appellants respectfully traverse this rejection.

1. **Judicial precedent has clearly established a legal standard for a *prima facie* anticipation rejection.**

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). In addressing obviousness determinations under 35 U.S.C. § 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.,* 383 U.S. 1 (1966). In *KSR*, the Court also reaffirmed that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *Id.* at 14. In this regard, the *KSR* court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does … because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *Id.* at 14-15. In *KSR*, the court noted that the demonstration of a teaching, suggestion, or motivation to combine provides a "helpful insight" in determining whether claimed subject matter is obvious. *KSR, slip op.* at 14.

Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); s*ee also, In re Lee,* 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002) (holding that the factual inquiry whether to combine references must be thorough and searching, and that it must be based on *objective evidence of record*).

2. **<u>The Examiner's use of the Larson and Rogers references to establish a *prima facie* case of obviousness against claims 9-16 is improper because the Larson and Rogers references, alone or in hypothetical combination, do not teach or suggest acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors *and* one or more types of non-electrical sensors as recited by claims 9-16.</u>**

With regard to independent claims 9-16, the Appellants note that claims 9-12 generally recite the acquisition of a set of image data and the acquisition of a set of motion data for a *respiratory organ* from both <u>electrical sensors **and** non-electrical sensors</u>. Likewise, claims 13-14 recite corresponding means for acquiring image data and means for acquiring motion data for a *respiratory organ* using <u>electrical sensors **and** non-electrical sensors</u>. Indeed, claims 15 and 16 separately recite an imager, a <u>sensor-based</u> motion measurement system configured to measure <u>non-electrical</u> activity of a *respiratory organ*, **and** a <u>sensor-based</u> motion measurement system configured to measure <u>electrical</u> activity of a *respiratory organ*.

In rejecting claims 9-16, the Examiner continues to rely on the incorrect interpretation that the MR imager described in the Larson reference can be properly correlated to an "electrical sensor." As described above with regard to claims 1-8 and 25-32, the Application *clearly* distinguishes between image-based and sensor-based systems for acquiring motion data. *See* Application, Figs 1 and 2; *see also* page 10, line 21 to page 11, line 12; *see also* page 11, line 14 to page 15, line 9. Also, as noted above, by equating the MR imager taught by the Larson reference to an electrical sensor, the Examiner is effectively ignoring the distinction set forth by the specification and, therefore, improperly applying the well established legal guidelines regarding claim interpretation in which pending claims must be given an interpretation that is <u>*reasonable*</u> and <u>*consistent*</u> with the specification, and that the interpretation must be what those skilled in the art would reach. *See In re Prater*, 162 U.S.P.Q. 541, 550-51 (C.C.P.A. 1969); *In re*

Morris, 44 U.S.P.Q.2d 1023, 1027-28 (Fed. Cir. 1997); *see also In re Cortright*, 49 U.S.P.Q.2d 1464, 1468 (Fed. Cir. 1999); *see also* M.P.E.P. §2111. For the same reasons discussed above with regard to claims 1-8 and 25-32, Appellants respectfully assert that the Examiner's interpretation is not only unreasonable when read in view of the specification, but that the Examiner's interpretation is not what one skilled in the art would reach.

With this distinction in mind, Appellants note that Larson reference primarily describes an image-based system for acquiring motion data, specifically, an MR imager. *See* Larson, paragraphs 10, 14, 25, 35. Appellants direct the Board's attention to page 5, paragraph 63 of the Larson reference stating that "respiratory motion could be synchronized with an implementation of this invention." Larson, paragraph 63. In other words, while the Larson reference does indeed describe acquiring respiratory motion data, such motion data is acquired using an image-based system (the MR imager), *not* a sensor-based system. Moreover, the *only* "sensor" even mentioned by the Larson reference is a conventional ECG for acquiring *cardiac* (heart) data. As such, the Larson reference appears to be *completely deficient* as to the use of sensors for acquiring *respiratory* motion data.

In view of these deficiencies, the Examiner further cited the Rogers reference. It appears that the Rogers reference discusses the use of pressure transducers, acoustic microphones, piezoelectric crystal transducers, strain gauges, and air flow meters, which may be applicable to either cardiac or respiratory motion. *See* Rogers, col. 5, lines 53-63. Appellants respectfully note that the underlying phenomena (pressure, acoustics, strain, air flow) measured by such devices are non-electrical in nature, as further acknowledged by the Examiner. *See* Final Office Action, page 7, lines 7-8 (the Examiner stating that a pressure transducer, acoustic microphone, and piezoelectric crystal transducer are all non-electrical devices). The Rogers reference further states that an RF-coil may be used for acquiring respiratory motion data. *See* Rogers, col. 5, lines 59-61. Although an RF coil may be regarded as electrical in nature, we believe it is well known in the art that an RF coil is a component of an MR imaging device. Moreover, it appears that RF coils, in the Rogers reference, are being discussed in the context of "[p]hysiological processes that would be suitable for synchronization by an MRI scanner." Rogers, col. 5, lines 49-65. As discussed above with regard to claims 1-8 and 25-32, the Application *clearly* distinguishes between image-based and sensor-based systems for acquiring motion data. *See* Application, Figs 1 and 2; *see also* page 10, line 21 to page 11, line 12; *see also* page 11, line 14 to page 15, line 9. Accordingly, given the proper claim interpretation discussed above with regard to claims 1-8 and 25-32, which the Examiner has continuously failed to apply throughout the prosecution of this Application, the RF coil, which functions as part of an MR imager, is clearly an image-based device for acquiring respiratory motion data, *not* a sensor-based device as suggested by the Examiner. Therefore, because the additional devices discussed in Rogers are non-electrical in nature, and because the only electrical device for acquiring motion data discussed in the Rogers reference is an imaged-based RF coil, as opposed to a sensor-based device, Appellants believe that the Rogers reference fails to teach or suggest an electrical *sensor-based* device for acquiring respiratory motion data, as recited generally by claims 9-16. As such, the Rogers reference fails to obviate the deficiencies of the Larson reference and, therefore, the Examiner has not established a *prima facie* case of obviousness against claims 9-16.

3. **The Examiner's use of the Larson and Rogers references to establish a *prima facie* case of obviousness against claims 17-24 is improper because the Larson and Rogers references, alone or in hypothetical combination, do not teach or suggest acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors *and* respiratory motion data acquired by at least one or one or more types of electrical sensors or non-electrical sensors as recited by claims 17-24.**

With regard to claims 17-24, the Appellants note that claims 17-20 generally recite the acquisition of a set of image data, *cardiac motion data* acquired by non-electrical sensors, **and** *respiratory motion data* acquired by electrical sensors or non-electrical sensors. Likewise, claims 21-22 recite corresponding means for acquiring image data and means for acquiring *cardiac motion data* using non-electrical sensors and *respiratory motion data* using electrical or non-electrical sensors. Indeed, claims 23 and 24 separately recite an imager, a sensor-based motion measurement system configured to measure non-electrical activity indicative of cardiac motion, <u>and</u> a sensor-based motion measurement system configured to measure <u>electrical</u> or <u>non-electrical activity</u> indicative of respiratory motion.

The Appellants respectfully note that neither the Larson reference nor the Rogers reference, alone or in combination, disclose the acquisition of image data and **both** non-electrical heart motion data **and** electrical or non-electrical respiratory motion data concurrently. First, as discussed above, the only sensor mentioned in the Larson reference is a conventional ECG for acquiring cardiac (heart) data. *See* Larson, paragraph 63. As such, the Larson reference does not appear to disclose the acquisition of cardiac data using a <u>non-electrical sensor</u>, as recited by claims 17-22, nor does the Larson reference discuss a sensor-based motion measurement system for measuring <u>non-electrical activity</u> indicative of cardiac motion, as recited by claims 23 and 24. Furthermore, as discussed above with regard to claims 9-16, the Rogers reference discusses the use of <u>non-electrical sensors</u> for acquiring respiratory motion data (*e.g.,* strain gauges, pressure transducer, acoustic microphone, piezoelectric crystal), and the use of an <u>electrical image-based</u> device (RF coil) for acquiring respiratory motion data. However, it does not appear that the Rogers reference contains any language suggesting the use of an *electrical* <u>sensor-based</u> device for acquiring respiratory motion data. As such, it appears that neither the Larson nor the Rogers reference, alone or in combination, discloses an <u>electrical sensor</u> for acquiring respiratory motion data.

Additionally, Appellants respectfully note that neither of the cited references discusses acquiring **both** <u>non-electrical heart motion data</u> **and** <u>electrical or non-electrical respiratory motion data</u> in a single embodiment of the respective inventions disclosed by the Larson and the Rogers references. At best, the Larson and Rogers references, alone or in combination, teach that image data may be acquired with <u>one</u> other physiological signal, which the Examiner has chosen to equate to the recited motion data of claims 17-24. *See, e.g.,* Rogers, FIG. 4. For example, Figure 4 of the Rogers reference shows that an MR imager 10 may be employed to acquire image data 30 along with a <u>single</u> additional physiological signal, such as ECG data 30 acquired by an ECG device 20. However, even if, for the sake of argument, this was correct, neither reference, alone or in combination, discloses the acquisition of image data along with **both** non-electrical cardiac motion data **and** electrical or non-electrical respiratory motion data, as recited by claims 17-22, nor do the cited references, alone or in combination, disclose separate systems to acquire **both** *non-electrical cardiac motion data* **and** *electrical or non-electrical respiratory motion data*, as recited by claims 23-24.

Accordingly, Appellants respectfully assert that the Larson and Rogers, alone or in hypothetical combination, fail to disclose each and every element of claims 17-24. As such, the Examiner has not established a *prima facie* case of obviousness against claims 17-24.

4. **The Examiner's use of the Larson and Rogers references to establish a *prima facie* case of obviousness against claims 9-24 is improper because neither the Larson nor Rogers reference, alone or in hypothetical combination, disclose motion compensation factors as recited by claims 9-24.**

In addition to being deficient for the reasons stated above, Appellants further assert that the Larson reference also fails to disclose the motion compensation factors recited by independent claims 9-24. Independent claims 9-24 each recite, *inter alia*, deriving "one or more motion compensation factors" and processing image data "based upon…the one or more motion compensation factors." (Emphasis added).

In rejecting claims 9-24 the Examiner stated in the Final Office Action that the Larson reference does indeed disclose motion compensation factors, as recited by claims 9-24. *See* Final Office Action, page 5, paragraph 10; *see also* page 6-7, paragraph 12 (stating that claims 9-24 are rejected under Section 103 for at least the same reasons claims 1-8 and 25-32 are rejected under Section 102). However, as discussed above with regard to claims 1-8 and 25-32, the Larson reference does not appear to describe motion compensation factors as the Examiner suggests. Rather, as discussed herein, Appellants believe the cited passages relied upon by the Examiner merely describe a technique for extracting gating intervals, which Appellants note is *separate and distinct* from the recited extraction of motion compensation factors. Therefore, for the same reasoning discussed above with regard to claims 1-8 and 25-32, the Larson does not appear to disclose the motion compensation factors recited by claims 9-24. Furthermore, the Rogers reference fails to obviate the deficiencies of the Larson reference and, therefore, the Examiner has not established a *prima facie* case of obviousness against claims 9-16.

5. **Request Withdrawal of the Rejection.**

In view of these reasons, Appellants respectfully request that the Board direct the Examiner to withdraw the rejection of claims 9-24 under 35 U.S.C. § 103(a) and to allow the claims.

Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or the Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

Date: November 19, 2007

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8. APPENDIX OF CLAIMS ON APPEAL

1. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of image data.

2. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of reconstructed data.

3. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

4. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

5. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

6. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data for two or more organs from at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

7. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of two or more organs during imaging to contribute to the set of motion data.

8. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the reconstructed data from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of two or more organs during imaging to contribute to the set of motion data.

9. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of image data.

10. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of reconstructed data.

11. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

12. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

13. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

14. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data for a respiratory organ from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

15. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry;

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data; and

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data.

16. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the reconstructed data from the data processing circuitry; and

a sensor-based motion measurement system configured to measure electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data; and

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data.

17. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of image data.

18. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest;

acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of reconstructed data.

19. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

20. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest;

a routine for acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

21. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

22. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest;

means for acquiring a set of motion data comprising cardiac motion data acquired by one or more types of non-electrical sensors and respiratory motion data acquired by at least one of one or more types of electrical sensors or one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

23. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry;

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a heart during imaging to contribute to the set of motion data; and

at least one sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data.

24. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the reconstructed data from the data processing circuitry; and

a sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a heart during imaging to contribute to the set of motion data; and

at least one sensor-based motion measurement system configured to measure electrical or non-electrical activity indicative of the motion of a respiratory organ during imaging to contribute to the set of motion data.

25. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of image data.

26. A method for processing image data, comprising the steps of:

acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

reconstructing the set of image data to generate a set of reconstructed data;

processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors; and

displaying or storing an image generated from the portion of the set of reconstructed data.

27. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

a routine for acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

a routine for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

28. A computer program, provided on one or more computer readable media, for processing image data, comprising:

a routine for acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

a routine for acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

a routine for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

a routine for reconstructing the set of image data to generate a set of reconstructed data; and

a routine for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

29. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

means for acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the sets of motion data to extract two or more retrospective gating points and one or more motion compensation factors; and

means for processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors.

30. An imaging system, comprising:

means for acquiring a set of image data representative of a region of interest from an imager of one of a MRI system, a PET system, a nuclear imaging system, an X-ray system, a PET-CT system, and an ultrasound system;

means for acquiring a set of motion data for a heart from one or more types of electrical sensors and one or more types of non-electrical sensors, wherein the set of image data is acquired substantially concurrent with the set of motion data;

means for processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors;

means for reconstructing the set of image data to generate a set of reconstructed data; and

means for processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors.

31. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest, wherein the imager comprises one of a MRI imager, a PET imager, a nuclear imager, an X-ray imager, a PET-CT imager, and an ultrasound imager;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, and to process a portion of the plurality of signals based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the plurality of signals from the data processing circuitry;

at least one sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a heart during imaging to contribute to the set of motion data; and

at least one sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the heart during imaging to contribute to the set of motion data.

32. An imaging system comprising,

an imager configured to generate a plurality of signals representative of a region of interest, wherein the imager comprises one of a MRI imager, a PET imager, a nuclear imager, an X-ray imager, a PET-CT imager, and an ultrasound imager;

data acquisition circuitry configured to acquire the plurality of signals;

data processing circuitry configured to receive the plurality of signals, to process a set of motion data to derive two or more retrospective gating points and one or more motion compensation factors, to reconstruct the plurality of signals to generate a set of reconstructed data, and to process a portion of the reconstructed data based upon the two or more retrospective gating signals and the one or more motion compensation factors;

system control circuitry configured to operate at least one of the imager and the data acquisition circuitry;

an operator workstation configured to communicate with the system control circuitry and to receive at least the processed portion of the reconstructed data from the data processing circuitry;

at least one sensor-based motion measurement system configured to measure non-electrical activity indicative of the motion of a heart during imaging to contribute to the set of motion data; and

at least one sensor-based motion measurement system configured to measure electrical activity indicative of the motion of the heart during imaging to contribute to the set of motion data.

9. **APPENDIX OF EVIDENCE**

None.

10. APPENDIX OF RELATED PROCEEDINGS

None.